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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/826,676	04/05/2001	Jin-Wen Tzeng	P-1026	3516

7590 04/22/2003

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EXAMINER

OWENS, DOUGLAS W

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 04/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/826,676	TZENG ET AL.
	Examiner Douglas W Owens	Art Unit 2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 06 February 2003.

2a) This action is **FINAL**. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-23 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 1-23 is/are rejected.

7) Claim(s) _____ is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.

12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) The translation of the foreign language provisional application has been received.

15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>12</u> .	6) <input type="checkbox"/> Other: _____

DETAILED ACTION

Claim Objections

1. Claim 22 is objected to because of the following informalities: The claim cites the limitation, "...wherein said one major surface to be to be in contact with said electrical component." This sentence is grammatically incorrect. Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
3. Claim 23 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 23 requires that the major surface comprises two major surfaces. The scope of the claim is vague because it is not known how one surface can also be two surfaces. Does the Applicant mean that the graphite sheet comprises an additional major surface or is the major surface of claim 10 divided into two portions?

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
- (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States

only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 10, 13 and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by US patent No. 3,404,061 to Shane et al.

Shane et al. teaches a process for producing a thermal interface (Col. 13, lines 19 – 21) having protective coating (Col. 14, lines 24 – 30, for example) that would have been sufficient to inhibit flaking of graphite particles (See also, Col. 1, lines 43 – 47), the process comprising:

forming a flexible graphite sheet , the sheet comprising expanded and compressed natural graphite particles (Col. 1, lines 25 – 28; Col. 4, lines 7 – 24), into the size and shape desired (Col. 13, lines 49 – 52), wherein the formed flexible graphic sheet has at least one major surface and at least one edge surface, and wherein the sheet has its directions of greater thermal conductivity parallel to the major surface (Col. 13, lines 10 – 23); and

coating the formed flexible graphite sheet with a material to form a protective coating, such that the material forms a protective boundary about the flexible graphite sheet (Col. 1, lines 43 – 47).

Regarding claim 13, Shane et al. teaches a process, wherein the material is coated on the formed graphite sheet on at least one of its major surfaces.

Regarding claim 23, Shane et al. teaches a process, wherein the graphite sheet comprises two major surfaces and one of the major surfaces is not coated.

6. Claims 1, 21 and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by US patent No. 6,262,893 to Liu.

Regarding claim 1, Liu teaches an isolated thermal interface (Fig. 1, (22)) comprising a flexible graphite sheet including particles of natural graphite (Col. 2, lines 50 – 55; Grafoil is known to include particles of natural graphite), at least one of the major surfaces coated with a protective coating sufficient to inhibit flaking of the particles of graphite (Col. 2, lines 62 – 64; The adhesive would have prevented flaking; Also, see Shane et al., where it is disclosed that Grafoil is coated on at least one major surface).

Regarding claims 21 and 22, Liu teaches a thermal interface, wherein one major surface is not coated with a protective coating (Col. 2, lines 62 – 64) and the major surface is aligned facing and in contact with an electrical component (20).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1-5 and 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over US patent No. 6,075,287 to Ingraham et al.

Regarding claim 1, Ingraham et al. teaches an isolated thermal interface (12, 12a) comprising a flexible (resilient) graphite sheet (Col. 6, lines 12-25) including particles of graphite and having two major surfaces, at least one surface coated with a protective coating (16) that would have inhibited flaking of the particles of graphite. Ingraham et al. does not explicitly teach that the flexible graphite sheet comprises natural graphite. It would have been obvious to one of ordinary skill in the art to use a known material,

such as GRAFOIL®, since it is well suited for the intended use. GRAFOIL®, an expanded and compressed natural graphite, manufactured by Graftech, a subsidiary of Union Carbide, is well known for its desirable thermal properties and use in electronics as heat sinks and thermal interfaces. See related US patent 3,404,061 to Shane et al. The selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

Regarding claim 2, Ingraham et al. teaches a thermal interface wherein the protective coating comprises a thermoplastic material (Col 5, lines 24-35).

Regarding claim 3, Ingraham et al. teaches a thermal interface, wherein the thermoplastic material comprises a polyimide.

Regarding claims 4 and 9, Ingraham et al. does not explicitly teach a protective coating that is no more than 0.025 millimeters or 0.015 millimeters in thickness. Ingraham et al. is silent with respect to the thickness of the protective coating. One having ordinary skill in the art would have been required to arrive at the optimal thickness of the protective coating through routine experimentation. Additionally, it has been held that optimization of a result effective variable is within the purview of one having ordinary skill in the art.

Regarding claim 5, Ingraham et al. teaches a thermal interface, wherein the protective coating is sufficient to electrically isolate the coated major surface of the flexible graphite sheet (Col. 5, lines 24-28).

Regarding claim 7, Ingraham et al. teaches a thermal interface, further comprising a layer of adhesive interposed between the protective coating and flexible graphite sheet (Col. 5, lines 30-35).

Regarding claim 8, Ingraham et al. does not teach a thermal interface, wherein the adhesive is selected from the group consisting of acrylic and latex materials. It would have been obvious to one of ordinary skill in the art to select acrylic or latex since they are known materials that are well suited for the intended use.

9. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ingraham et al. as applied to claims 1-5 above, and further in view of US patent No. 5,834,337 to Unger et al.

Ingraham et al. does not teach a thermal interface, wherein the graphite sheet has edge surfaces that are coated with a protective coating to inhibit flaking. Unger et al. teaches a thermal interface, wherein edges of the graphite interface are coated with a protective coating (Col. 4, lines 13-19). It would have been obvious to one of ordinary skill in the art to incorporate the teaching of Unger et al. into the device taught by Ingraham et al. since it is desirable to prevent graphite particles from contaminating undesired areas of the device.

10. Claims 10-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ingraham et al. in view of Unger et al.

Regarding claims 10, 11 and 13, Ingraham et al. teaches a process for producing a thermal interface having a protective coating (16) sufficient to inhibit flaking of graphite, the process comprising:

forming a flexible graphite sheet into the size a shape desired for a thermal interface;

wherein the flexible graphite sheet has at least one major surface and at least one edge surface; and

coating the major surfaces with material to form a protective coating.

Ingraham et al. does not teach that the material forms a protective boundary about the flexible graphite sheet. Unger et al. teaches a thermal interface, wherein edges of the graphite interface are coated with a protective coating (Col. 4, lines 13-19) such that the protective boundary is formed about the thermal interface. It would have been obvious to one of ordinary skill in the art to incorporate the teaching of Unger et al. into the device taught by Ingraham et al. since it is desirable to prevent graphite particles from contaminating undesired areas of the device.

Ingraham et al. does not explicitly teach that the graphite sheet has its direction of greater thermal conductivity parallel to the major surface. Ingraham et al. teaches a resilient graphite sheet that has excellent thermal properties. It would have been obvious to one of ordinary skill in the art to select known resilient graphite sheet, such as an expanded graphite sheet produced by Union Carbide sold under the trade name of GRAFOIL®, since it is well suited for the intended use. GRAFOIL® is known to have greater thermal conductivity in a direction parallel to the major surface (See Col. 13, lines 10-23 of Shane et al.). The selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

Ingraham et al. does not teach that the graphite sheet comprises expanded and compressed natural graphite particles. It would have been obvious to one of ordinary skill in the art to select GRAFOIL for the graphite sheet, as explained above. It is known in the art that GRAFOIL comprises expanded and compressed natural graphite particles.

Regarding claim 12, neither Ingraham et al. nor Unger et al. teach coating the graphite sheet by spray coating, roller coating or hot laminating press. The cited references are silent with respect to how the protective coating is applied, so one having ordinary skill in the art would have been required to select a known method of applying the protective coating. It would have been obvious to one of ordinary skill select spray coating, roller coating or hot laminating press since these are known methods of applying a protective coating.

Regarding claim 14, Ingraham et al. teaches a process, wherein the material is coated on the flexible graphite sheet by laminating with adhesive (Col. 5, lines 30-35). Neither Ingraham et al. nor Unger et al. explicitly teach cutting the flexible graphite sheet after coating the sheet with laminate. It would have been obvious to one of ordinary skill to cut the flexible graphite sheet into the desired shape and size, since it is desirable for the graphite to fit properly in the device. It would have further been obvious to coat the flexible graphite sheet either before or after cutting, since it has been held that choosing an order of processing steps only involves routine skill in the art (See *Ex parte Rubin*, 128 USPQ 440).

Regarding claim 15, Ingraham et al. teaches a process, wherein the material comprises a thermoplastic material.

Regarding claim 16, Ingraham et al. teaches a process, wherein the material comprises a polyimide.

Regarding claims 17 and 20, Ingraham et al. does not teach a process wherein the protective coating that is no more than 0.025 millimeters or 0.015 millimeters in thickness. Ingraham et al. is silent with respect to the thickness of the protective coating. One having ordinary skill in the art would have been required to arrive at the optimal thickness of the protective coating through routine experimentation. Additionally, it has been held that optimization of a result effective variable is within the purview of one having ordinary skill in the art.

Regarding claim 18, Ingraham et al. teaches a process, further comprising a layer of adhesive interposed between the protective coating and flexible graphite sheet (Col. 5, lines 30-35).

Regarding claim 19, Ingraham et al. does not teach a process, wherein the adhesive is selected from the group consisting of acrylic and latex materials. It would have been obvious to one of ordinary skill in the art to select acrylic or latex since they are known materials that are well suited for the intended use.

Response to Arguments

11. Applicant's arguments filed February 6, 2003 have been fully considered but they are not persuasive.
12. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the

references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the applicant bases the argument that there is no motivation to combine on the assertion that GRAFOIL is not resilient, as required by Ingraham et al. The applicant's argument is based on the statement in lines 46 – 51 of column 9 of Shane et al., wherein Shane et al. discloses that a very important characteristic of the expanded graphite particles is that the particles in masses can be compressed under load and maintain the compression set. The applicant infers that this means that the GRAFOIL can be compressed and will not return to its original shape, which would mean that the GRAFOIL is not resilient. However, when the complete teaching of Shane et al. is taken into consideration, it can be seen that the passage referenced by the applicant is a discussion of the expanded graphite particles of the partially completed GRAFOIL. A similar discussion is found in lines 46 – 50 of column 12, where it is disclosed that the expanded particles are easily compressed under load. Note that a load must be applied even to the partially completed GRAFOIL to achieve the compression. It is again asserted that the completed GRAFOIL product is indeed highly resilient and desired for use in many applications because of the resiliency. Evidence of this can be seen in Col. 3, lines 45 – 64 of US patent No. 5,288,054 to Bake et al., where a discussion of the resiliency of GRAFOIL is presented. Also see column 1, lines 10 – 20 of US patent No. 4,455,334 to Ogino et al. and column 4, lines 51 – 57 of US patent No. 4,611,813 to Guerrero.

13. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

14. The applicant asserts that there is no motivation to combine the teaching of Unger et al. with the teaching of Ingraham et al. Unger et al. discloses that plating of the graphite heat transfer element helps "...to ensure cleanliness in the application of the typically graphite fiber-based heat transfer heat transfer element..." in lines 13 – 19 of column 4. Unger et al. is cited to show that there is a need to ensure cleanliness in applications using graphite heat transfer elements. Unger et al. also teaches a solution that meets that need.

Conclusion

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas W Owens whose telephone number is 703-308-6167. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

DWO
April 16, 2003

Tom Thomas
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